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ABSTRACT

In the spring of 1979 an experimental study was conducted to evaluate the possible effects of Reflective Teaching (RT) on preservice teachers at the Ohio State University. Reflective Teaching is a new instructional alternative for teacher education featuring peer teaching and evaluation. The hypothesis being tested stated that, as a result of engagement in Reflective Teaching, preservice teachers will be better able to identify a greater number and wider variety of variables present during the act of teaching. The hypothesis was tested by asking both treatment and control groups to view a twelve minute videotape and respond to an instrument which asked subjects to list the things that they saw in the videotape which they considered to be important to teaching and learning. For each item identified as important they were also asked to respond to why it was important. Following the treatment and control conditions, the same instrument was administered using a new video tape. The scores were analyzed separately using analysis of variance for a partial hierarchical design with pretest and posttest as a repeated measure. Significant difference was not found between control and treatment sections. (Authors/JN)

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The Experimental Effect of Reflective Teaching on Preservice Teachers' Ability to Identify a Greater Number and Wider Variety of Variables Present During the Act of Teaching

by

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Abstract

In the spring of 1979 an experimental study was conducted to evaluate the possible effects of Reflective Teaching on preservice teachers at The Ohio State University. Reflective Teaching is a new instructional alternative for teacher education. This paper reports the testing of one of the hypotheses about Reflective Teaching, "As a result of engagement in Reflective Teaching, preservice teachers will be better able to identify a greater number and wider variety of variables present during the act of teaching." The hypothesis was tested by asking both treatment and control groups to view a 12 minute video tape and respond to an instrument which asked subjects to list the things that they saw in the video tape which were important to teaching and learning. For each item identified as important they were also asked to respond to why it was important. Following the treatment and control conditions, the same instrument was administered using a new video tape. The resultant data was content analyzed for number of variables (total number of variables named), variety of variables, and kind of reason. The variety of variables were coded into 5 categories: Personal Quality, Teaching Technique, Management, Substantive Process, and Non-verbal. The kind of reasons were coded into: no reason, circular reason, judgment without reason, and complete reason. Each of the three scores was analyzed separately using analysis of variance (ANOVA) for a partial hierarchical design with pretest and posttest as a repeated measure. Significant difference was not found between control and treatment sections.

This paper is one of a series on Reflective Teaching presented at the Annual Meeting of AERA in Boston, Massachusetts in 1980:

1) Williams, E.J. and Hough, J.B., "The Experimental Development and Field-Testing of Reflective Teaching Lessons."

2) Williams, E.J. and Kennedy, J.J., "The Effects of Reflective Teaching Relative to Promoting Attitudinal Change."

3) Nott, D.L. and Williams, E.J., "The Experimental Effects of Reflective Teaching on Preservice Teachers' Ability to Identify a Greater Number and Wider Variety of Variables Present During the Act of Teaching."

4) Wilsman, M. and Kennedy, J.J., "Variations in Preservice Teachers' Modes of Reflecting About Teaching According to Their Conceptual Levels and Participation in Reflective Teaching."

5) Holton, J. and Nott, D.L., "The Experimental Effects of Reflective Teaching on Preservice Teachers' Ability to Think and Talk Critically About Teaching and Learning."

The Introduction and Design Sections of these papers are similar.

Introduction

The purpose of this paper is to describe one part of a larger study on the experimental effects of Reflective Teaching. Reflective Teaching provides a practice teaching experience with feedback and knowledge of results in a safe, laboratory setting. This report will briefly describe Reflective Teaching and then explain the testing of one of the several hypotheses about Reflective Teaching.

Development of Reflective Teaching

Reflective Teaching was developed at The Ohio State University in 1972 when college instructors began to conceptualize an on-campus teaching experience for undergraduate preservice education majors that would provide practice teaching and knowledge of results. As they developed the new form of practice teaching they desired that it should:

1. provide a common teaching experience and permit several teachers to teach concurrently, thus providing more teaching experience;
2. provide an opportunity to reflect on the many factors that can affect teaching and learning, thus providing an opportunity to understand the complexity of teaching;
3. provide students an opportunity to try out their own teaching style;
4. provide preservice teachers an opportunity to engage in the complete act of teaching;
5. provide the teacher with feedback or knowledge of results; and
6. be technically simple (not require specialized equipment such as video), highly transportable, and not require more than a fifty minute class period.

For several years Reflective Teaching was used as a regular part of the general methods course at The Ohio State University. Then in 1978, Professor Donald P. Cruickshank received a two year grant from the Exxon Education Foundation to further develop Reflective Teaching. The grant provided for development of materials and an experimental study. A field test of Reflective Teaching during the fall of 1978 (Williams and Hough, 1980) provided the staff with information about the Reflective Teaching process. Reflective Teaching evolved and developed as a result of its use in general methods classrooms, as college instructors and students provided feedback about Reflective Teaching and the Reflective Teaching Lessons.

Description of Reflective Teaching

Reflective Teaching provides students the opportunity to engage in the complete act of teaching--planning, executing, and evaluating instruction--under supervised conditions. Because each Reflective Teaching Lesson (RTL) contains a measure of student achievement of criterion material and learner satisfaction, teachers are provided with knowledge of results. Reflective Teaching begins when the college instructor divides the class into groups

of four to six students and designates one person in each group as teacher. The designated teachers receive the same RTL (containing a teaching objective, necessary materials, and a way to evaluate learner achievement and satisfaction) and prepare to teach it during the next class session in whatever way they believe best to attain learner achievement and satisfaction. The following day the designated teachers teach the short (10-15 minute) lesson concurrently to their learning groups (peers). It should be noted that this form of peer teaching does not require college students to pretend they are children. Following the teaching of the lesson, the designated teachers evaluate the learning. This data provides information for the next part of Reflective Teaching--the reflection. Reflection is the careful consideration of what has occurred during the teaching-learning experience and possible reasons for outcomes in light of the evidence.

Reflection is usually done in two parts. Each small learning group reflects in specific and concrete ways about the teaching-learning that has occurred. Students can first describe the experience, making information public, such as: the teacher may describe how he/she planned to teach; the learners may describe how they felt about the evaluation; the teacher may describe problems in meeting the objective. Next, the small groups can consider questions about the teaching-learning experience such as: What were the factors that affected the teaching and learning? What might the teacher have done differently to improve learner achievement and satisfaction? The answers to these questions are considered using the data from the teaching-learning experience.

Following small group reflection the college instructor assembles the different groups for large group reflection. During this time students have an opportunity to discuss the different ways in which the lesson was taught, the factors which influenced the teaching and learning, and other issues that are deemed important by the college instructor. In the large groups, since several different people taught the same lesson, students are provided with more information that they can use in making generalizations about teaching. Alternative hypotheses may be generated. Students can consider questions such as: How does teacher behavior affect learner achievement? How can tests be constructed so that achievement can be measured? What kinds of tests can be used to measure what kinds of learning? As students begin to generalize about teaching their reasons can be examined in terms of what happened during the different Reflective Teaching Lessons. These generalizations can be treated further in later RTLs. During large and small group discussion, students have the opportunity to talk about teaching and its complexity.

The Experimental Study of Reflective Teaching

The field test of Reflective Teaching during the fall of 1978 (Williams and Hough, 1980) provided the staff with information about the reflective teaching process as well as generating a set of hypotheses for the experimental study, Spring 1979. The four major hypotheses that were tested were:

1. As a result of engagement in Reflective Teaching, participants will identify a greater number and wider variety of variables present during the act of teaching.
2. As a result of engagement in Reflective Teaching, participants subsequently will be more able to think and talk analytically about

teaching and learning (Holton and Nott, 1980).

3. As a result of engagement in Reflective Teaching participants will:
   a. manifest a more positive disposition towards their undergraduate course-related preparation.
   b. manifest a more positive and realistic view of themselves as teachers.
   c. manifest a more realistic view of the role and demands of teaching (Williams and Kennedy, 1980).

4. Those participants with higher conceptual levels who have had Reflective Teaching experience will present a more reflective mode of thinking than those who have not had the experience (Wilsman and Kennedy, 1980).

This paper will focus on the first hypothesis above. The source of this hypothesis was based on the belief that focused reflection on teaching should cause participants to become more aware of variables that are present during the act of teaching. Relatedly common sense would indicate that awareness of the variables and the complexity of teaching is a prerequisite of teacher effectiveness.

Method

Procedure

The hypotheses were tested using four classes of Educational Foundations and Research 435, a general methods class required for secondary education majors at The Ohio State University. Two classes were randomly selected as the experimental group and the remaining served as the control group. Students were assigned to sections by conversion computer scheduling. Four instructors, three Reflective Teaching staff members and another graduate teaching assistant (who had previous experience using RT) were then randomly assigned to the four classes to teach the six hour experimental part of the course. Classes were divided into four to six groups with five or six students randomly assigned to a group. The treatment and control conditions occurred on three consecutive Thursdays (April 5, 12, 19, 1979) for a total of six hours.

The treatment consisted of six Reflective Teaching Lessons. Each student was randomly assigned a Reflective Teaching Lesson to teach. Thus, in a group of six each student would teach one time and be a learner five times. In order to provide a record of the teaching, for later inspection, two of the RT learning groups were videotaped, as were all of the large group discussions. The control sections received a unit entitled, "The Roots of the Teaching Profession 1800-1918," developed by a Reflective Teaching staff member. The control treatment was designed to be educationally valid yet clearly different from the treatment received by the treatment sections. The Reflective Teaching sections had the opportunity to experience real teaching and then to reflect on the teaching experience. The control sections had the opportunity to reflect, but on something they had read about, rather than actually experienced. The experimental sections had 23 students and 32 students for an N of 55. The control sections had 20 students and 26 students for an N of 46.

Design

The design structure was a classical two-group pretest-posttest control group design augmented with two nested variables: a) sections of Ed:F&R 435 and; b) RT groups (subgroups consisting of five or six students within sections of Ed:F&R 435). The principal variable consisted of exposure to or nonexposure to Reflective Teaching. This experimental variable will be termed the Treatment variable. As previously noted, four intact sections of Ed:F&R 435 participated in the study. Section assignment to the two levels of the treatment variable was random; consequently, the second variable incorporated into the general design was Sections, two of which were nested within the RTL condition and two within the control condition.

Sections were partitioned into at least four groups made up of five to six students per group. Student assignment to groups within sections was accomplished through random procedures. Groups, therefore, constituted an additional nested factor. Finally, the pre and posttest information provided by participating students was treated as a within-subjects variable (i.e., a repeated measurement) and subsequently built into the overall design structure.

The overall design arrangement which governed the data collection in this experiment may be described as a partial hierarchical design with repeated measurements (Kennedy, 1977, pp. 538-551). Below is a listing and brief description of the variables described.

1. Treatment (T_j where $\underline{j} = 1,2$):
   a) T_1 = exposure to Reflective Teaching
   b) T_2 = exposure to control activities

2. Sections (S_k where $\underline{k} = 1,2$):
   a) two sections randomly assigned to T_1, the RT condition
   b) two remaining sections assigned to T_2, the control condition

3. Groups (G_m where $\underline{m} = 1,2,\ldots,6$):
   a) six RT groups randomly structured within S_1 of T_1
   b) four RT groups randomly structured within S_2 of T_1
   c) four control groups randomly structured within S_1 of T_2
   d) five control groups randomly structured within S_2 of T_2

4. Pre-posttesting (P_o where $\underline{o} = 1,2$):
   a) P_1 = pretest measures
   b) P_2 = posttest measures

5. Subjects (S_i where $\underline{i} = 1,2,\ldots,n$):
   a) total of 55 students arranged into 10 groups who participated in the RT treatment condition
   b) a total of 46 students arranged into 9 groups who did not participate in the RT treatment, but instead were exposed to an alternate experience.

In addition to the aforementioned variables, two RT groups within each of the two sections that received the Reflective Teaching treatment were randomly identified for videotaping of RT activities. In an attempt to

clarify the layout of the generic design arrangement, Figure 1 is provided. It should be noted, however, that to enhance clarity and conserve space, the pre-posttesting repeated measurements variable has been omitted.

Treatment Conditions	Sections Within Treatment	Groups Within Sections: Videotaping	Groups Within Sections: No Videotaping
Treatment: Students exposed to RT	Section 1	Group 1 (n=6)	Group 3 (n=5)
			Group 4 (n=5)
		Group 2 (n=6)	Group 5 (n=5)
			Group 6 (n=5)
	Section 2	Group 1 (n=6)	Group 3 (n=5)
		Group 2 (n=5)	Group 4 (n=6)
Control: Students exposed to an alternative activity	Section 1	Group 1 (n=5)	Group 3 (n=5)
		Group 2 (n=5)	Group 4 (n=5)
	Section 2	Group 1 (n=6)	Group 3 (n=5)
		Group 2 (n=5)	Group 4 (n=5)

Figure 1. Layout of generic design structure for the RTL field experiment minus the inclusion of the pre-posttesting variable.

Instrumentation

All class sections were given a set of pretests on March 29, 1979.

The pretest for this hypothesis required students respond to the I Was and Believe to be Important instrument used in conjunction with a specially made videotape. A videotape was chosen to provide a stimulus for student's observation of number and variety of variables for a common teaching event. A videotape would also provide a record which could later be examined by experts to judge the validity of student responses. The twelve minute videotape portrayed a male junior high school teacher instructing fifteen seventh graders on the topic of the Kachuan Language (a Reflective Teaching Lesson). The color videotape, of good technical quality, focused mainly on the teacher's activity. Students were asked to respond using the instrument after one viewing of the videotape. A written transcript of the videotape was provided to help students recall the teaching episode.

The instrument for this hypothesis contained the following directions:

You will see a video tape of a teaching episode. You may use the typescript to help you remember the episode to answer the questions. Each "because" statement should correspond to a statement about what you say, however, you may make statements about what you saw and think important without giving a "because" statement.

1. List below the things you saw that might have contributed to or detracted from teaching and learning.

   I saw and believe to be important _____

2. Why or in what way do you believe it contributed to or detracted from teaching and learning?

   It was important because _____

To aid in the analysis the instrument had boxes for each separate variable the students listed.

Following the six hour treatment a posttest battery was administered April 24, 1979. The posttest for this hypothesis was parallel test, consisting of the same format as the pretest. The videotape segment for the posttest is the continuation of the lesson used for the pretest. The posttest videotape was approximately 30 seconds shorter than that for the pretest. Students were again provided with a written transcript of the tape. Because the tests were administered pre and post to all subjects, a comparison could be made of the effects due to treatment.

Analysis

Data was examined using content analysis (Holsti, 1969) to obtain three separate scores for Number of Variables, Variety of Variables, and Kind of Reasons. The unit of analysis for all categories was the sentence or in some cases the phrase (when student responses were not in complete sentences). An important criterion of content analysis is that categories need to be clearly defined and should be both mutually exclusive and inclusive.

The Number of Variables score was obtained by counting the number of responses in the "important" column. If the same statement was listed more than once, it was counted as one variable. In some instances students listed two variables as part of a compound sentence. In this case, a score of two variables was given. The total score was obtained for each student by summing the number of variables they had listed as seen on the videotape.

The Variety of Variables score was obtained from the same data, but looked at the variety of variables named by participants. After studying the data, a decision was made to derive categories deductively from the data. The following categories were derived: Personal Qualities, Teaching Technique, Management, Substantive Process, and Nonverbal. These categories are not present in the literature, but do seem to relate to the way in which the sample of undergraduate students observed the videotape and are mutually exclusive and inclusive. The score was obtained by counting the number of different categories named. In order to make scores on numbers and variety similar in magnitude, the number of categories named by students was multiplied by 2.6. The number 2.6 was used since it made the averages on

number of variables and variety of variables similar. The scores range from 0 (when no variables were listed) to 13.0 (when five different categories of variables were listed). Students were not given any categories as advanced organizers before looking at the videotape, nor were the categories mentioned during Reflective Teaching.

The categories needed to be operationally defined as well as the scoring procedure made explicit so that data could be analyzed reliable. A description of each category follows:

Personal Quality. A personal quality is the personality characteristics of a person (student or teacher). This refers to a complex set of behaviors which are interpreted by the student rather than a single behavior at the observational level. When a student response is "The teacher is nice," an interpretation of observed behaviors has been made. This category is similar to the presage category in the Mitzel model (Mitzel, 1960), but is different in that it includes students as well as teachers. Examples include: knowing student's names; teacher's voice; quality of enthusiasm; confidence; teacher's dress; and student's desire to learn material.

Teaching Technique. Teaching technique refers to a specific instructional behavior which is not related specifically to content. Microteaching skills such as use of examples, use of enthusiasm, repetition and review are examples. These techniques are often the content (vocabulary) of much of a general methods class, and are therefore the teaching language preservice teachers learn in their undergraduate education courses. A teaching technique is different from personal quality in that technique is usually at the observational level and requires little abstraction. Another area needs to be distinguished. If the student referred to a specific area of the curriculum when naming a technique, then the statement would be categorized as "substantive process."

Examples include: "The teacher repeated definitions," "The teacher asked higher order questions," and "The teacher used audiovisual aids."

Management. Management is the arrangement and structuring of the classroom and the learning environment. It is the process by which the teacher arranges the classroom in order to establish climate. This would include rules established by the teacher. Ways in which the teacher structures time, space, order and participation are included in this category.

Examples: "The teacher went slow enough for the students to understand," "The teacher called on the students by name," and "The teacher had students raise their hands."

Substantive process. The substantive processes of a classroom are those that are content or curriculum related. These are variables which are closely related to the content of the lesson and include the summary, the introduction, the objectives, the way in which the teacher gives meaning to the lesson, and the use of certain words during the presentation of a substantive nature. When a technique is referred to with regard to the content of the curriculum, then the variable would be in this category. Teaching technique was distinguished from substantive process in this way: technique is the "how" something is done and substantive is the "what" or content of the course.

Examples: "The teacher gave definitions for Kachuan words like 'ice'," "The teacher summarized the lesson," and "The teacher gave examples of how the Kachuan people lived."

Nonverbal behaviors. These behaviors are not verbal and include all nonverbal gestures and movements. This category is not parallel to the other categories, but cuts across both techniques and personal qualities in many cases.

Examples: "The teacher moved around the room," "The teacher smiled," and "The teacher scratched his head as if puzzled."

Inspection of responses according to the five categories measured to what extent students were able to see a wider variety of variables present during the act of teaching.

The third score, Kind of Reason, was derived by examining the second part of the instrument which had participants explain why the factors observed were important. These responses were categorized according to complexity. No response was scored zero. If a circular reason was given it was scored 1 (for example, if a student redefined the variable without giving a reason). A score of 2 was given when participants made a positive or negative judgement without stating the reason for this judgement. For example, if a student gave "the teacher smiled" as a variable and then stated "it is good to smile at students" for a reason, the reason would be scored two. A score of three was given when participants gave a reason that was of a higher order, i.e., a reason was provided. Below is a sample from a student test with the scoring results.

I saw and believe to be important	It was important because
The teacher was nice. (Personal quality)	(no reason = 0)
The teacher used higher order questions. (Teaching Technique)	More difficult questions (circular reason = 1)
Good control of class. (Management)	No time wasted for management (reason provided = 3)
Teacher moves around the room (nonverbal)	Moving helps students (judgement = 2)

The above example was scored 4 for Number of Variables, 10.4 (4 x 2.6) for Variety of Variables and 6 for Kind of Reason.

The reliability of the data was checked by randomly selecting a twenty percent sample which was then coded by a project consultant following training. Lights coefficient for nominals was used, the most stringent reliability formula available for coding items into categories (Frick and Semmel, 1978). Reliability for Number of Variables was .93; for Variety of Variables was .80; and was .72 for Kind of Reason score.

To analyze the data, each set of scores--Number of Variables, Variety of Variables, and Kind of Reason--was analyzed separately using analysis of variance (ANOVA) for a partial hierarchical design with pretest and posttest as a repeated measure. The unit of analysis was RT groups since much of the activity of Reflective Teaching is a small group activity. Because of software problems eight students were removed to make the groups equal.

A posttest only instrument was administered to Reflective Teaching participants only. This instrument asked RT participants to register beliefs about 34 statements concerning Reflective Teaching. Students responded to 34 completion statements using the following stem: "As a result of your six hour experience with Reflective Teaching, to what extent do you believe you . . ." Two of the statements relate to students ability to see a greater number and wider variety of variables present during the act of teaching.

Results

Resultant data, consisting of means and standard deviations for the three scores of Number of Variables, Variety of Variables, and Kinds of Reason by treatment groups are contained in Table 1. Examination of Table 1 revealed the Number of Variables and Variety of Variables scores did not support the previously stated hypothesis. The Kind of Reason score did appear to show a difference in change scores between control and experimental section, showing an increase for the RT participants and a decrease for the control group.

Insert Table 1 about here

The three separate scores were subjected to an analysis of variance for a partial hierarchical design with pretest and posttest as a repeated measure. The first score, Number of Variables obtained significant difference (see Table 2) for main effects of treatment (RT/control groups $F = 5.23$, $p \leq .05$.). However, these effects are not meaningful in terms of the Reflective Teaching treatment in that both control and treatment sections declined slightly from pretest to posttest.

Insert Table 2 about here

Upon inspection of Table 3 (ANOVA for Variety of Variables) significance was observed for the first order interaction of treatment by testing, $F = 7.52$, $p < .05$. Treatment by testing interaction is the meaningful interaction in terms of trying to find support for this hypothesis. A follow-up procedure using Dunn's Test produced no results that were significant and

meaningful. The Reflective Teaching and control groups showed significant posttest differences, but the control group students scored higher than the Reflective Teaching members on the posttest.

Insert Table 3 about here

The results of the analysis of variance performed on the Kind of Reason score is shown in Table 4. Significance ($F = 6.16$, $p < .05$) was obtained for the first order interaction of treatment by testing (this again is the meaningful interaction for treatment effects from Reflective Teaching). Since the treatment and testing interaction was significant at the .05 level, a follow-up using Dunn's Test was performed but did not show any significant differences between groups. Although the treatment group did do better than the control group on the posttest, it was not significant.

Insert Table 4 about here

Thus, support for the hypothesis--that Reflective Teaching participants would be able to identify a greater number and wider variety of variables present during the act of teaching than the control students--was not substantiated by analysis of data from the instrument using the videotape as a stimulus.

Although statistical significance was not obtained at the .05 level, a posttest only instrument, given to Reflective Teaching students only, does give some support for this hypothesis.

Reflective Teaching participants in responding to 34 completion statements responded positively to two questions that seem germane to student's ability to identify a greater number and wider variety of variables present during the act of teaching:

> 75% believed they were better able to identify factors that affect teaching and learning, and
>
> 80% believed they were better able to think of a greater variety of ways to accomplish a learning objective.

Discussion

Reflective Teaching provided students with an opportunity to teach and then to reflect upon that teaching. Consequently several hypotheses were generated. One of these hypotheses examined the ability of students to identify a greater number and wider variety of variables. This was measured using a videotape of a teaching episode as the stimulus. Statistical support for this hypothesis was not obtained.

There were several possible reasons why statistical support for this hypothesis was not obtained:

1. Reflective Teaching, although it may do many things, may not increase a student's ability to name a greater number and sider variety of variables that affect teaching and learning.

2. There was no way to ensure that RT subjects in their small group really attended to specific questions that were supposed to focus on identifying criterion variables.

3. During Large Group Discussion, students were asked to respond to the question: "What were the factors that contributed to or detracted from learner achievement and satisfaction?" However, this was only one question from a larger set and therefore possibly not enough time and emphasis was placed on this question to provide significant difference.

4. Although students were asked to identify variables, at no time were they asked to name variables in a wide variety of categories, nor were they given a framework for thinking about variables in terms of types.

5. Possibly the test of the hypothesis was not adequate, since a videotape may not be a valid instrument for measuring student's ability to identify variables.

6. Because the videotape focused mainly on the teacher, it is possible that sutdents believed they were to think of what was important only in terms of teacher behaviors, which would reduce the variety of variables they might have named.

7. Treatment of only six Reflective Teaching Lessons may not be a strong enough treatment to increase a student's ability to see a greater number and wider variety of variables. If students did Reflective Teaching longer, possibly a change would occur.

8. It is possible that the two videotapes used were not similar enough in richness of variables to provide a reliable pre-post comparison.

9. It is possible that students did not take the test seriously since they were observed to be less interested in the posttest than the pretest. Also the test for this hypothesis was the last test given.

10. Possibly treatment was confounded by content from the rest of the course, such as microteaching.

Since Reflective Teaching students believed (1) they could identify factors and (2) were able to think of a greater variety of ways to accomplish a learning objective, it seems justifiable to search for other ways to determine the truth of the hypothesis.

Table 1

Means and Standard Deviations of the Three Variable Scores by Reflective Teaching and Control Groups

Measure	Pretest Mean	SD	Posttest Mean	SD
(1) Number of Variables				
RT treatment	8.56	3.17	8.23	6.75
Control treatment	7.30	3.20	7.03	2.82
(2) Variety of Variables				
RT treatment	9.26	2.61	8.83	2.95
Control treatment	8.69	3.51	10.16	4.92
(3) Kind of Reason				
RT treatment	2.03	0.66	2.11	0.71
Control treatment	2.39	0.56	2.03	0.63

Note: N for RT group was 55
N for control group was 46

Table 3

ANOVA of Number of Variables by Treatment (RT/Control), Groups and Test (Pretest/Posttest)

Source	df	MS	F	p
Between Subjects	93			
Between Groups	17			
Treatment	1	70.0194	5.23	*
Groups/Treatment	16	13.3904	1.02	
Within Groups	76			
Ss/Group/Treatment	76	13.0914		
Within Subjects (Ss)	94			
Test	1	4.0514	0.80	
Treatment & Test	1	.3606	0.07	
Group & Test/Treatment	16	5.0373	1.05	
Test & Ss/Group/Treatment	76	4.8669		
Total	187			

* $p \leq .05$

Table 3

ANOVA of Variety of Variables by Treatment (RT/Control), Groups, and Test (Pretest/Posttest)

Source	df	MS	F	p
Between Subjects Ss	93			
Between Groups	17			
Treatment	1	6.5910	0.3	
Groups/Treatment	16	20.2578	1.8	
Within Group	76			
Ss/Group/Treatment	76	11.0977		
Within Subjects (Ss)	94			
Test	1	12.6300	2.24	
Treatment & Test	1	42.4710	7.52	*
Group & Test/Treatment	16	5.6452	0.77	
Test & Ss/Group/Treatment	76	7.3560		
Total	187			

* $p \leq .05$

Table 4

ANOVA of Kinds of Reason by Treatment (RT/Control), Groups and Test (Pretest/Posttest)

Source	df	MS	F	p
Between Subjects Ss	93			
Between Groups	17			
Treatment	1	.8938	1.77	
Groups/Treatment	16	.5058	.97	
Within Groups	97			
Ss/Group/Treatment	76	.5208		
Within Subjects (Ss)	94			
Test	1	.9845	2.69	
Treatment & Test	1	2.2557	6.16	*
Group & Test/Treatment	16	.3661		
Test & Ss/Group/Treatment	76	.3016		
Total	187			

* $p < .05$

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